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FOREST INSECTS AND DISEASES

CONSERVATION TEACHING AID

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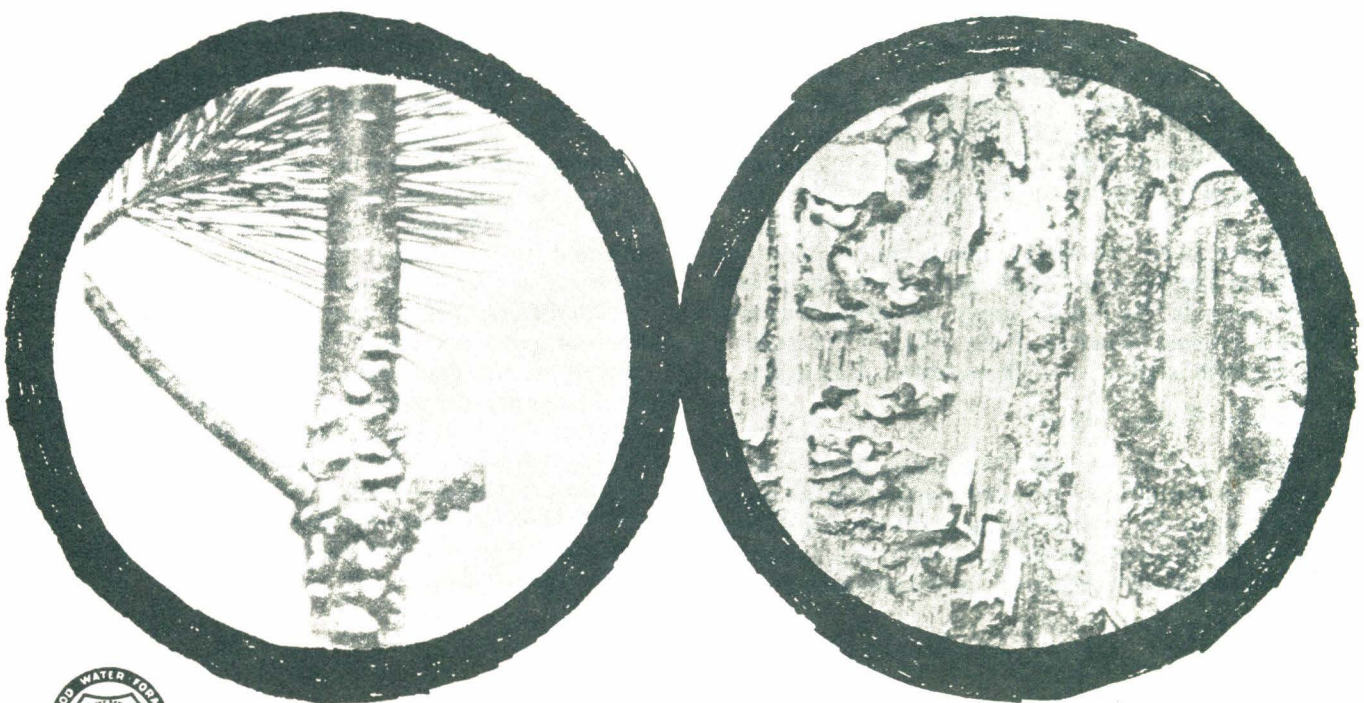

FOREST SERVICE ▲ U.S. DEPARTMENT OF AGRICULTURE

FOREST INSECTS AND DISEASES

Each year forest trees are faced with destruction by two of their greatest enemies—insects and diseases. During an average year, forest insects and diseases will kill 7.3 billion board feet of sawtimber. "Sawtimber" refers to trees that can be sawn into lumber. However, killing sawtimber is only part of the damage caused by insects and diseases. These pests also cause loss by weakening the trees and slowing up tree growth—a loss estimated to be 21.2 billion board feet of sawtimber each year. Insects and diseases, then, cause a total loss of 28.5 billion board feet annually in trees of sawtimber size. This amount of lumber would build 2½ million five-room homes —enough to house all the people living in New York City

Forest insect and disease destruction is important to us in another way. People who like to camp, fish, and hike in the woods enjoy an environment of healthy trees. Dead or dying trees do not make a very pretty setting for such recreational activities.

Harmful Forest Insects

Several kinds of insects damage or kill forest trees. Some destroy the cones and seeds of pines, spruce, and firs. When this happens there are fewer seeds to start new trees. In some years, almost all of the seeds are destroyed by insects and no new trees can get started.

Seedling trees growing in a nursery or young trees growing in the forest are often killed by white grubs that feed on the roots. White grubs are the larval stage of the June beetle. These grubs increase the cost of growing trees in the nursery and reduce the number of new trees growing in the forest.

Several kinds of weevils attack trees of sapling size. Weevils are snout-nosed beetles. A "sapling" is a young tree grown to a trunk thickness of from 2 to 4 inches. The weevils like to chew the leaders and twigs. This prevents the young tree from growing normally and often kills the top. The tree then becomes crooked as the undamaged parts continue to grow. When the tree is cut, the lumber is not very valuable because straight trees are much more valuable for lumber than crooked trees.

Caterpillars, measuring worms, and other similar kinds of insect larvae that feed on leaves and needles of trees are also destructive to forests. In some years, they occur in great numbers over large areas and strip the trees of all their leaves and needles. When this happens, thousands of trees may be killed and large volumes of valuable timber lost. The spruce budworm, Douglas-fir tussock moth, pine butterfly, and tent caterpillars are examples of insects that feed on leaves and needles.

Bark beetles are the most destructive insects in the pine, fir, and spruce forests in the United States. They usually attack and kill mature or overmature trees. "Overmature" trees are those that are old and have stopped growing. As they become older, they become weaker and more susceptible. The larvae or wormlike forms of these beetles feed under the bark of trees, next to the wood. They usually kill a tree in a single season by cutting off the flow of sap from the roots to the needles. Severe outbreaks of bark beetles may kill all the trees in a forest in 3 or 4 years' time.

Controlling Forest Insects

The insects that damage or kill forest trees may be controlled in several ways. For example, fast-growing forests are less likely to be attacked by many insects; thus, by harvesting the old, weak, and diseased trees, much damage can be prevented. The insects that feed on leaves and needles of trees can be killed by spraying the forest with chemicals, called pesticides. Weevil damage to young trees can be reduced by sprays and dusts. Bark beetles, while difficult to control because they are hidden inside the bark of the tree, can be reduced by cutting the tree down and burning the bark or by spraying the bark with a chemical that soaks in to kill the larvae.

Men trained in the use of pesticides are able to destroy the insects without undue harm to fish and wildlife in the forest. These men spray tree trunks with hand sprays to kill bark beetles. They spray treetops from helicopters or airplanes to kill insects that eat leaves, needles, buds, and twigs. They are careful to use just the proper chemical solution in the right place and at the right time to kill the particular insects that are causing the damage. They do not want to kill anything but the harmful insects.

Forest Tree Diseases

Trees, like man, are subject to many diseases. Some tree diseases affect the leaves, others the main woody parts (trunks, branches, and twigs), and still others the roots. They cause losses by killing or deforming trees, by lessening their rate of growth, and by destroying the wood already produced.

Two very important killing diseases were accidentally introduced into our forests from abroad. These were the chestnut blight and the white pine blister rust. The chestnut blight was brought to this country from Asia about 1900. It has since destroyed all American chestnut stands in the United States. Only a few widely scattered individual trees remain.

The white pine blister rust disease was introduced from Europe about 1898. By 1915 it had spread widely in the Eastern States, and by 1921 it was present in the Western States. Since then it has spread into practically all parts of the United States where white pines grow. This disease attacks and kills only the white, or five-needled, pines. (You can always tell one of the white pines because there are five needles in each little bundle.) Three of the native five-needled pines are among our most valuable timber trees. They are the eastern white pine of the Eastern and Lake States, the western white pine of the northern Rocky Mountain region, and the sugar pine of California and Oregon.

The blister rust fungus spends part of its life cycle on currant or gooseberry bushes. It cannot spread directly from pine to pine. Therefore, one way to control it is to remove the gooseberry and currant bushes that grow among or near the white pines. Blister rust control operations started in 1922. White pine stands in 19 States are now being protected against the rust. The breeding of white pines resistant to blister rust is showing promise in several parts of the country. This will provide a new attack in the battle against the disease.

Native diseases also cause great losses in our forests. Some examples are oak wilt, brown-spot needle blight, fusiform rust, and dwarfmistletoe, a parasite.

Oak wilt is an important disease in most of the Midwestern, Eastern, and Southern States. It attacks all native oaks in these States but develops most rapidly in red and black oaks, which die quickly once attacked.

In the South, brown-spot needle blight attacks longleaf pine seedlings and slows their growth by killing the needles. Carefully controlled burning of infected needles and ground vegetation in plantations or in areas of natural reproduction helps control the disease. This is one example of how fire can be used to good advantage in forestry.

Fusiform rust is another disease confined to the South, where it attacks several pines but causes greatest damage to loblolly and slash pines. Cankers caused by this disease weaken the trunk so that the tree breaks off in high winds. Like white pine blister rust, fusiform rust cannot spread from pine to pine. This rust must spend part of its life cycle on oak leaves. Since oaks are also valuable trees and since there are so many of them, it is not practical to control fusiform rust by removing the oaks.

Dwarfmistletoes are serious pests in western coniferous forests. These parasites grow on the branches and stems, retarding growth and killing the

trees. The dwarfmistletoes are related to the Christmas mistletoe, but should not be confused with it.

The way dwarfmistletoes spread is interesting. The seeds, when ripe, are shot out of the casings with enough force to travel as far as 40 feet. The seeds are sticky, and, if they strike branches of the same tree or other susceptible trees, they may cling to them and start new plants. In this way dwarfmistletoes spread slowly but steadily to other trees in the forest. By cutting infected trees for lumber or pulp, or by removing infected branches, dwarfmistletoes are controlled by eliminating the seed source.

Needs of the Future

Most forest insect and disease pests are so well established and so widely distributed that eradicating them completely is impossible. The aim in control work is, therefore, to keep the damage caused by them within tolerable limits. Methods for controlling many serious forest pests are known and used. Research scientists are constantly working to find new and more effective methods of suppressing destructive forest insects and diseases. Federal quarantine laws are rigidly enforced to reduce the danger of introducing forest pests from other countries.

Good Forest Management

In the long run, good forest management helps greatly in the defense against destructive forest insects and diseases. Losses can be reduced by harvesting trees before they reach the most susceptible age and by removing trees of low vigor before they are attacked. However, good management alone will never do the whole control job. Indirect control with natural predators of insects and disease organisms, and direct control with chemicals will probably always be needed to keep losses within tolerable limits.

More Research Is Necessary

To control forest pests we must learn all we can about their life histories and habits. Then we can try to destroy them during the most vulnerable stages in their growth. The Forest Service carries on research to find out how each kind of insect and disease can be controlled. Much more research is needed.

Research on forest insects and diseases has been done mainly by public agencies, such as the U.S. Department of Agriculture, the States, and universities. Large timber companies are doing research on various pests that are of concern to them. The chemical and drug companies are also doing research to develop insecticides and fungicides useful in chemical control of pests.

While carrying on this research on insects and diseases in forest areas, men of the Forest Service work in close cooperation with biologists employed by State Fish & Game Commissions and the Fish and Wildlife Service, Department of the Interior. Together they determine whether insecticides and fungicides used in the control of pests may have harmful effects on forest animals, birds, and fish. They make studies and tests to find just the proper solutions of chemicals that will kill the pests and yet be of least danger to wildlife, their food supplies and homes. Technicians of the Public Health Services, both Federal and State, maintain constant vigilance regarding the danger to people who hunt or fish in forest areas where chemicals are used to control pests.

Prompt Detection and Attack

A good detection system can find many small outbreaks of forest insects or diseases before they become epidemics. The Forest Service makes surveys to locate outbreaks that may need to be controlled. When necessary, and after review and approval by several agencies, control action is undertaken to prevent the pest from causing more damage.

The Forest Service works closely with the States and with private landowners to prevent or minimize losses caused by forest insects and diseases. Prompt action against forest pests will keep down both the cost of control and the losses.

When control of an epidemic is undertaken, it must be carried through to completion on public as well as private land. Otherwise the work may be wasted effort.

Suggested Activities

(If possible, get information from a local forester or the county agent to help plan and carry out activities.)

Make a survey of tree insects in the local community; have each pupil bring in five tree insects and report when and where each was found, whether or not they were numerous, and the kind and amount of damage.

Write and produce a play about forest rangers and their fight to control forest insects and diseases.

Make a map of the United States showing parts in which various tree insects and diseases are prevalent.

Collect pieces of wood showing typical disease damage, typical insect damage, or both, and learn to know the names of some of the common forest insects and diseases.

Discuss the use of the airplane to help control forest insects. Can it be used for all kinds of forest

insects? What are the dangers in using insecticides for spraying large forest areas?

Prepare charts of the life histories of various forest insects. Illustrate the kinds of trees they affect and the kinds of damage they cause.

Find out how white pine blister rust came to America; describe its effect on our forests and tell how it can be controlled.

Find out how much your community, your State and your Federal Government spend on controlling forest diseases and insects yearly. Compare these amounts to the value of the forests protected.

Discuss how serious outbreaks of forest insects or diseases may affect the economy of a forest community.

Note to Teachers

Other CONSERVATION TEACHING AIDS are available to teachers on request. Address your inquiry to Forest Service, U.S. Department of Agriculture, Washington, D.C. 20250, and ask for FS-28, MATERIALS TO HELP TEACH FOREST CONSERVATION.

GPO 864-871